

# Fish and Amphibians from the Neolithic pile-dwelling site Mooswinkel in Lake Mondsee, Austria

Msc Dafni Nikolaidou | Austrian Academy of Sciences | Austrian Archaeological Institute  
 Dr. Alfred Galik | Austrian Academy of Sciences | Austrian Archaeological Institute



**Abstract:**

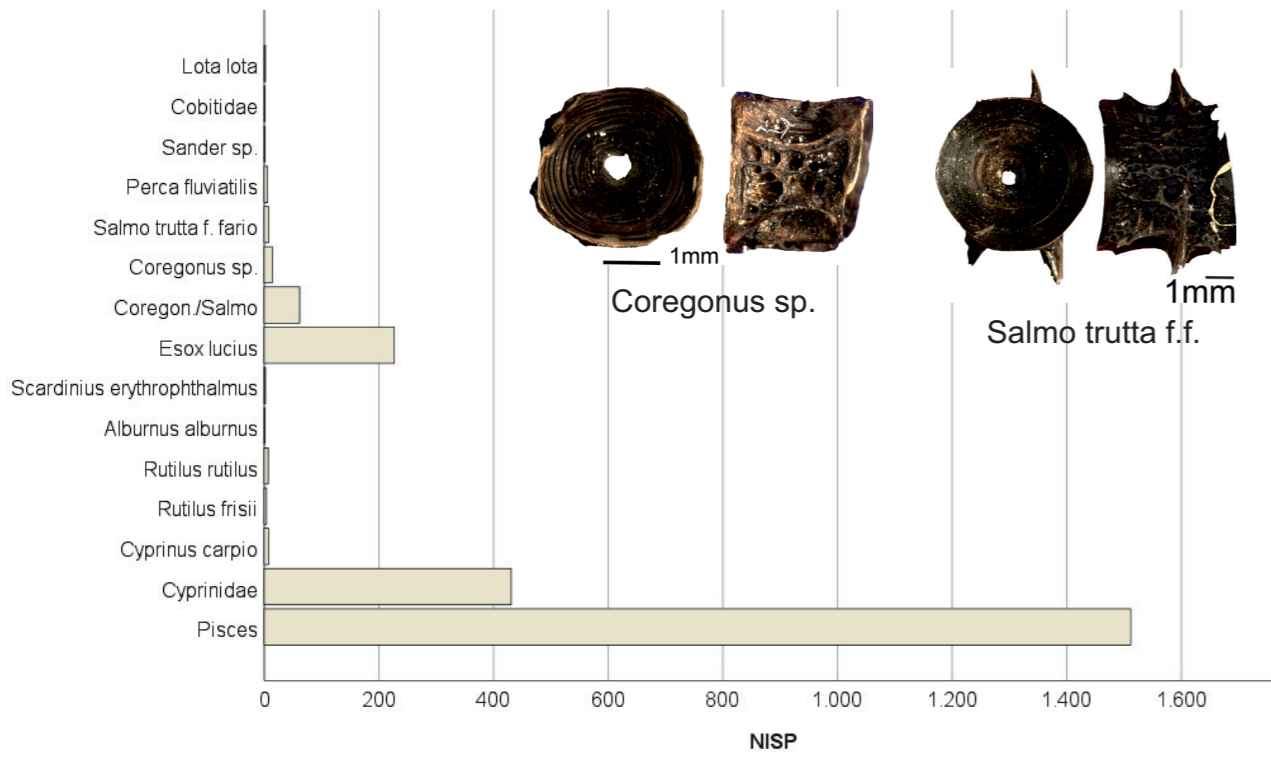
Mooswinkel is a Neolithic, underwater pile dwelling located in Lake Mondsee, Upper Austria and dates to the 4th millennium BC. Recent excavations were carried out in an interdisciplinary research initiative "Zeitensprung" (Leap in Time). At least three in-situ cultural layers separated by erosional sediment horizons, were recovered, presenting outstanding state of preservation from waterlogged sediments. Therefore, Mooswinkel is offering valuable ichthyo-archaeological material and data for a better understanding of fish exploitation in the first half of the 4th millennium BC. The fish remains, which were carefully selected from the floated and sieved sediment samples are important information sources on fishing and fish consumption of the Neolithic settlers at Lake Mondsee.

The various fish species indicate the repertoire of fishing techniques such as near-shore fishing and net fishing in more open waters. However, in addition to the typical freshwater fish (i.e. cyprinids, northern pike, river perch, brook trout and coregonids) large quantities of mainly frog bones were recognized. More than the fish remains, this raises the question whether the frogs accumulated naturally or reflect part of the inhabitants' nutrition.

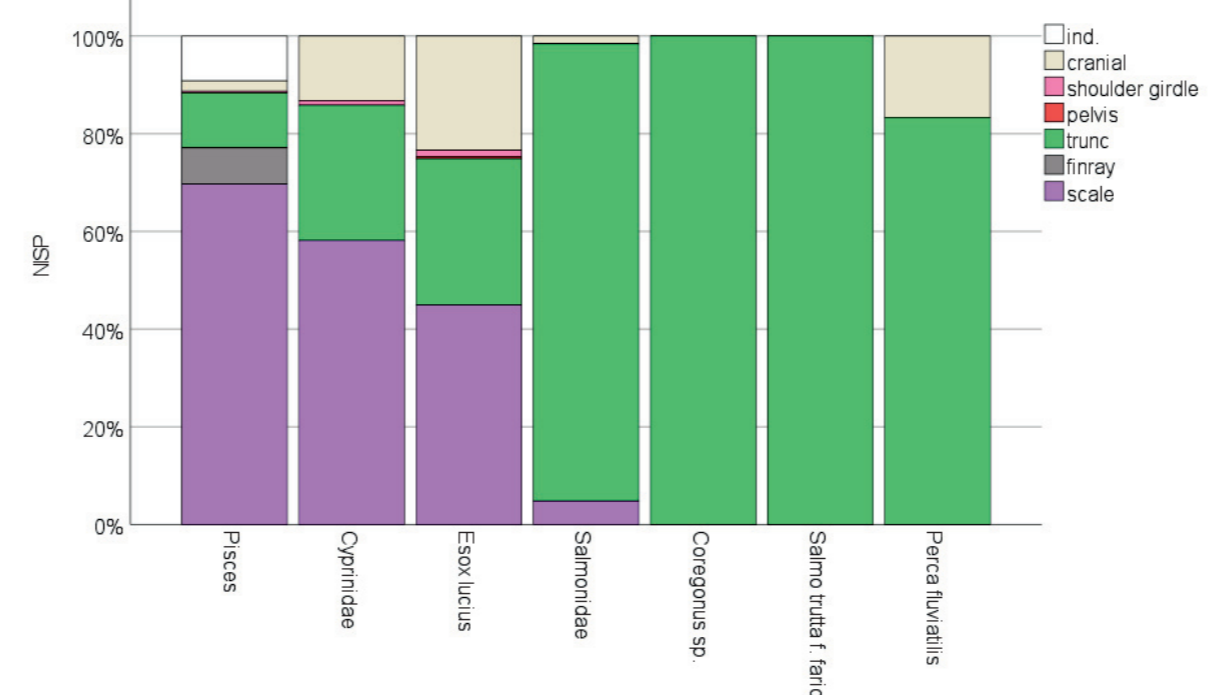
**Keywords:** Austria, ichthyo-archaeology, Neolithic, waterlogged sediment



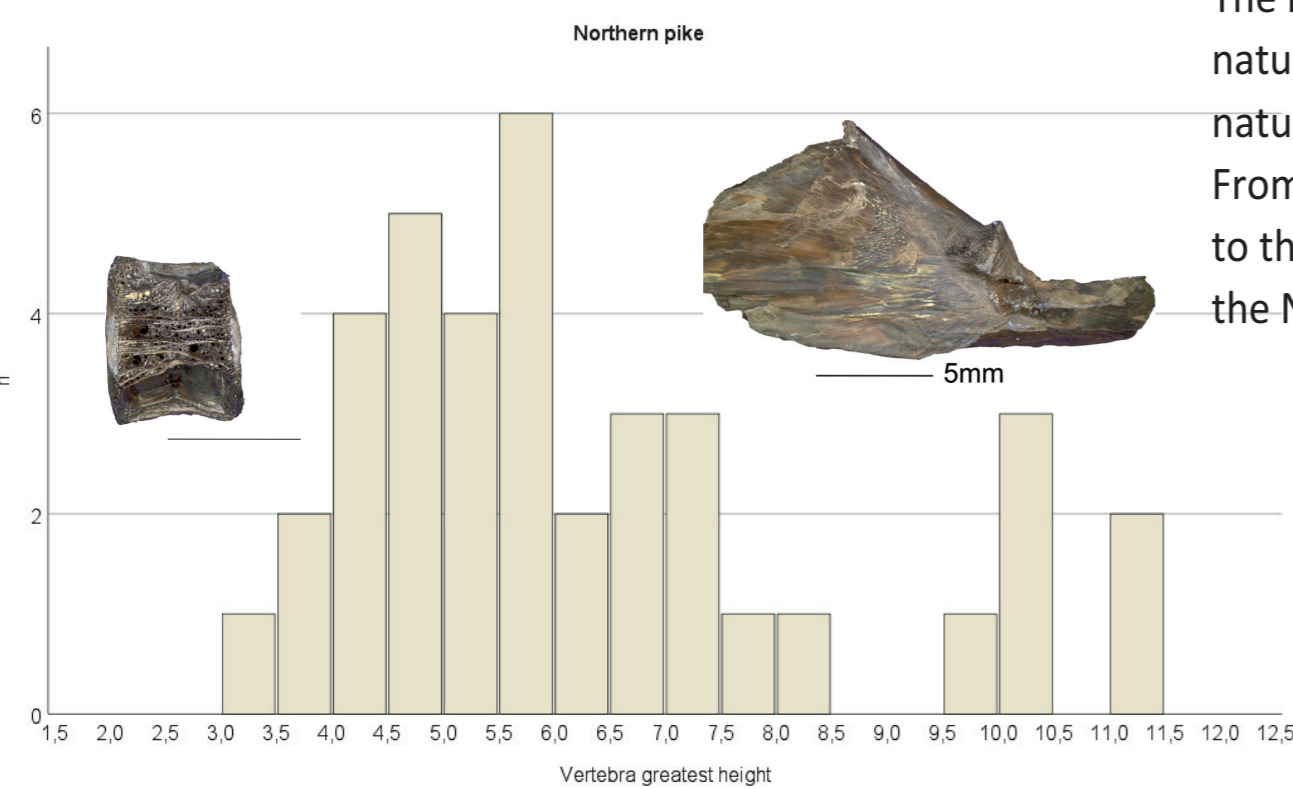
https://www.pfahlbau.at/fragen-und-antworten/ Grafik: Gerald Egger



The major part of the underwater excavated ichthyological material remains not identifiable, followed by the most frequent species of cyprinids and northern pike. At least some of the species among the cyprinids are identifiable, such as common carp, common roach, Black sea roach, common rudd and bleak. Other used fishes are whitefish and brook trout. In many cases these remains, which are mainly fragmented vertebrae, are not clearly identifiable. However, the more completely preserved bones indicate both species. At this alpine-type lake in Austria river perch was probably of less importance for the nutrition of people. However, other occasionally proven fishes in this assemblage are pikeperch, loaches and burbot.

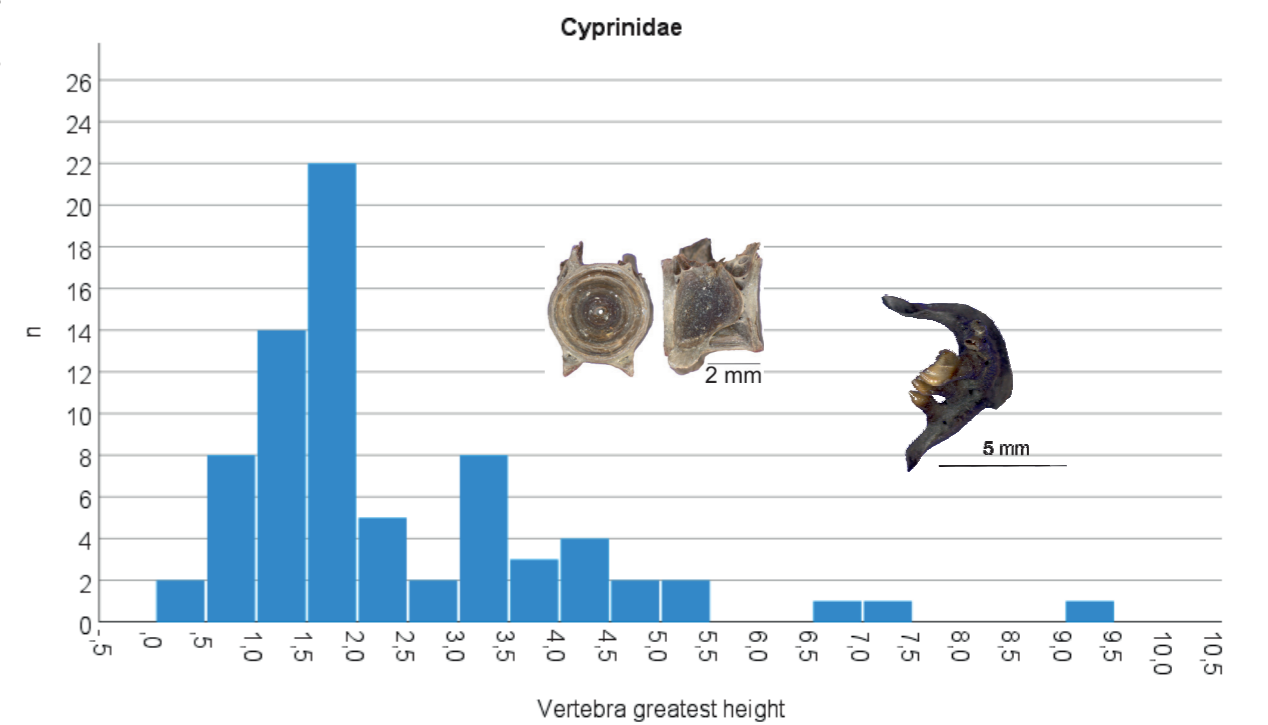


Many unidentifiable scale fragments and fin rays besides other not identifiable bones fragments still are recognizable as fish remains. Fish scales were identified as cyprinids and pike, quite a few rather small but very cycloid-scales may stem from brook trout. River perch is not represented by scales yet, but dominated mainly by vertebrae. A similar pattern, what makes the identification in combination with fragmentation of vertebrae complicated, is to be observed with whitefishes and brook trout, which are represented by vertebrae only. In Cyprinids a higher frequency of trunc elements is visible as in northern pike. In northern pike cranial elements seem to be underrepresented, though the number of isolated teeth is not indicated in this graph here. Nevertheless, all observations together may indicate an exploitation and consumption of complete fishes within the settlement, though in salmonids and coregonids the cranial elements are almost totally missing up to now.



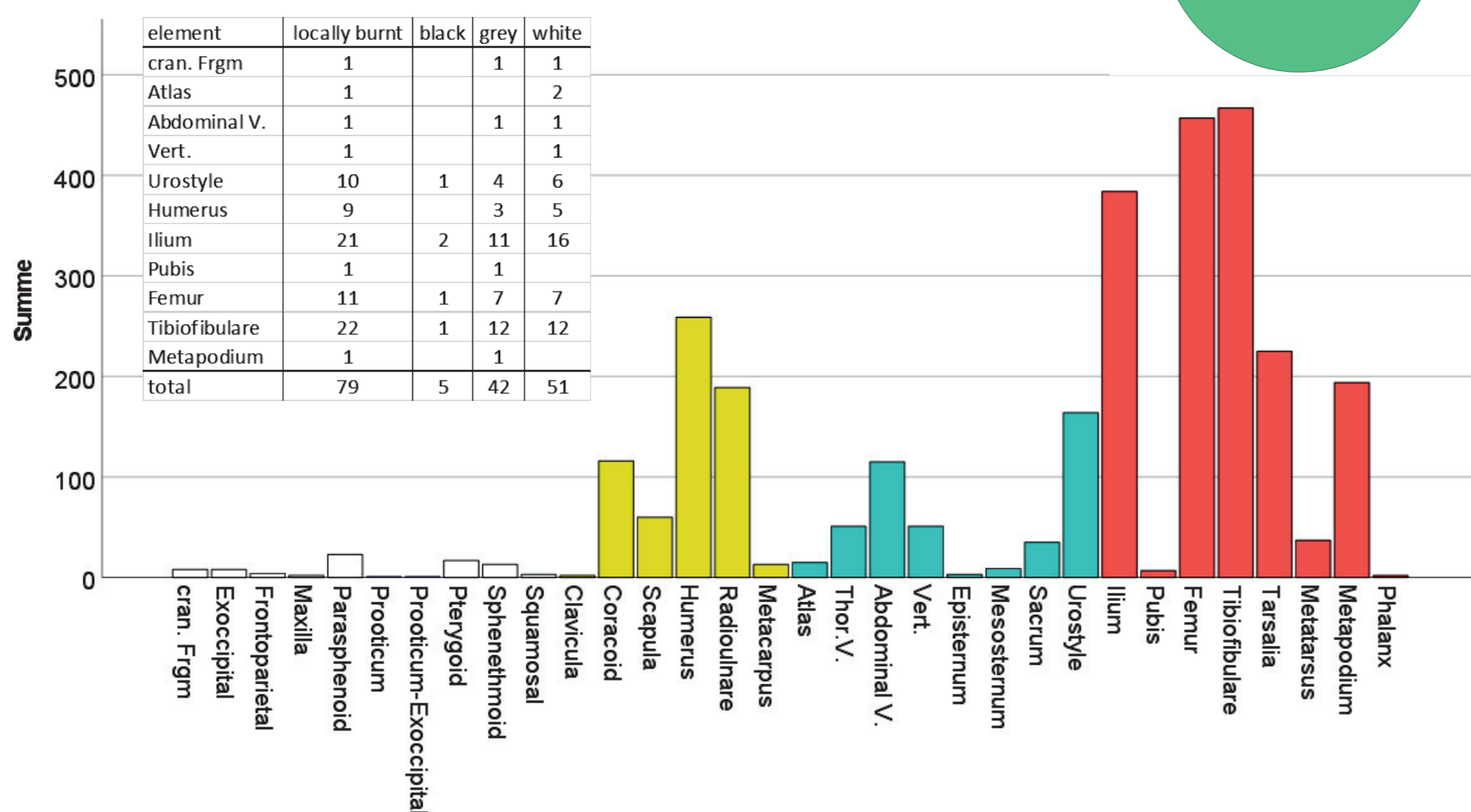
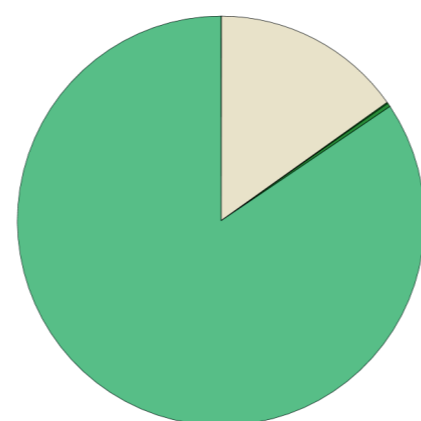
The remains are coming from an underwater excavation, raising the question of natural contamination and intrusion of modern fishes. I guess the chance of natural intrusions fish bones, that died in the excavated area, is relatively low. From my experience the preservation of rezent fish remains is clearly different to the Neolithic material and on the other hand burnt fish remains also point to the Neolithic exploitation of fishes at the site.

	burnt bones	black	grey	calcinated
Pisces	7	19	15	
Cyprinidae	1	2	4	
Esox lucius	5	13	7	
Salmonidae	1	2	3	
Lota lota			1	
Perca fluviatilis			1	

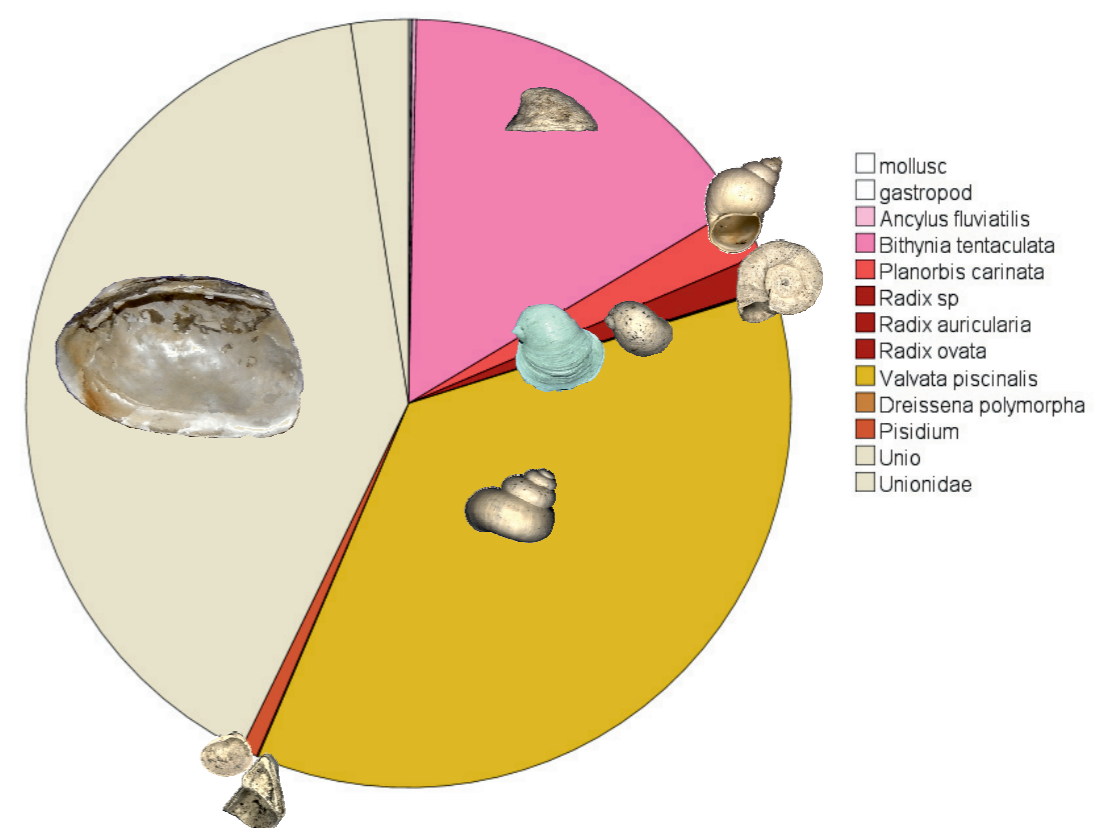


To get a feeling for the caught fishes and their size distributions, vertebral dimensions – here the greatest height of the corpora are used in graphs in millimetre. The size of vertebrae shows a large peak from less than 1 millimetre up to 2 millimetres indicating the exploitation of young and rather small fishes. Larger vertebrae between 2,5 and 5,5 millimetres represent larger cyprinids up to 20 and 30 centimetres and one specimen with a diameter of about 9 millimetres suggest a large cyprinid, but not common carp, eventually is comes from a large Black sea roach.

The distribution of northern pike vertebrae shows a first peak between 3 and 6 millimetres and specifies individuals in a standard length of about 20 to 40 centimetres. A smaller peak goes up to 8,5 millimetres of corpus height indicating exploitation of larger individuals, and the largest specimens with a height of about 10 millimetres are less frequent but are coming from fishes in a size of about 60 to 70 centimetres.



The amphibian remains consist almost exclusively of frog bones. The bones reflect relatively few skull and trunk remains, such as vertebrae. Bones from the anterior extremity are better represented and remains from the posterior extremity, on the other hand, appear overrepresented. In the case of frogs, more than in the case of fish, the question arises whether this is an accumulation of naturally deceased animals or whether human activity is responsible for this accumulation. Similar to fish, a significant number of charred bones occurred. The traces of charring and the accumulation of "frog legs" make it likely that frogs, which were certainly found locally in masses at certain times, also served as a food resource for the prehistoric inhabitants of the pile-dwelling settlement.



Within the taken sediment samples, many molluscs appeared in the sieve residues. The shells of gastropods and bivalves can clearly be separated into recent intrusions covering all the small gastropods and bivalves. The graph indicates a very high level of identified species, indicating a high proportion of completely preserved shells of the recent intrusions, which can be found in all age classes from juvenile to adult. Some of the gastropods still have their operculum in position. On the other hand, shells of Unionidae are heavily fragmented and usually not completely preserved. A certain amount of valves indicate direct exposure to fire, so most likely these remains represent disposal of Neolithic usage of the bivalves and are no modern intrusions.